NEST SITE SELECTION AND PRODUCTIVITY OF GREAT HORNED OWLS IN CENTRAL MINNESOTA

by
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Abstract

Thirty-three active nests (16 artificial, 17 natural) of the Great Horned Owl (*Bubo virginianus*) were found in central Minnesota in 1977. Sixteen of the 17 natural nests were originally built by the Red-tailed Hawk (*Buteo jamaicensis*). Average nest height was 14 m; 42% of the nests were in northern pin oak (*Quercus ellipsoidalis*); 79 percent in edge areas, 21 percent in woodlot interiors. Nests averaged 0.59 km from the closest human dwelling and 0.58 km from the closest graded road. Nest density in a thoroughly searched area was 0.21 per km^2. Utilization of artificial nest platforms was 52 percent.

The first incubating owl was seen on 20 February; the latest clutch was laid during the first week in April. Five of 7 clutches contained two eggs; 10 of 19 successful nests contained two nestlings. Forty-two percent of initial nesting attempts failed. Successful nests produced 1.8 young per nest. Artificial nests were less successful than natural nests, probably because of more human activity at artificial nest sites. An unusual distraction display involving an adult owl is described.

Introduction

The Great Horned Owl (*Bubo virginianus*) has adapted to a variety of habitats throughout most of North, Central, and South America (Bent 1938). In the rather extensively farmed rural areas of central Minnesota, it is a common inhabitant of woodlots and forested riverbottoms, often sharing these areas with another common raptor, the Red-tailed Hawk (*Buteo jamaicensis*). Because of their close association, I had an excellent opportunity, in conjunction with a study of the Red-tailed Hawk, to collect data on Great Horned Owls.

Methods and Materials

Nests were located in February, March, April, and May 1977 by systematically searching wooded areas for Red-tailed Hawk nests and when rechecking raptor nests located in previous years. A nest was classified as active when an owl was observed sitting atop the nest, apparently incubating, on at least two occasions during the nesting cycle. To create as little disturbance as possible at nests, observations were made, when possible, from a distance. To avoid the chilling of eggs and/or young, nest trees were generally not climbed during February, March, and early April. Nest heights were determined with an optical measuring device called a Relaskop. Nestlings were banded prior to fledging. Observations were by 10 by 50x binoculars and a 15-60x spotting scope. Nest locations were plotted on aerial photo maps (1:24,000), from which distances were calculated.

The Study Area

Thirty-three Great Horned Owl nests were found in central Minnesota in 1977: 15, 8, 5, and 5 nests, respectively, in Benton, Morrison, Sherburne, and Stearns counties. Habitat varied within the study area, but woodlots are typically dominated by pin oak (*Quercus ellipsoidalis*)/red oak (*Quercus borealis*), trembling aspen (*Populus tremuloides*), or sugar maple (*Acer saccharum*)/basswood (*Tilia americana*). Tree species in low-lying areas and riverbottoms include tamarack (*Larix laricina*), American elm (*Ulmus americana*), green ash (*Fraxinus pennsylvanica*), black willow (*Salix nigra*), and others. Some nests in Morrison County were in stands of jack pine (*Pinus Banksiana*) and large-toothed aspen (*Populus grandidentata*). Terrain in all counties is generally flat to moderately rolling. Although the study area is a transition zone containing sugar maple/basswood climax forest, oak savanna, and tall grass prairie, agricultural and lumbering practices have greatly changed the original appearance of the area.

Results and Discussion

Nest Site Selection. Sixteen of the 33 nests utilized by Great Horned Owls were manmade nest platforms. I erected 14 of them in 1976. Two were erected by other individuals prior to 1976. Of the 17 natural nests, one was a small leaf-and-twig structure probably built by squirrels (*Sciurus spp.*), and 16 were old Red-tailed Hawk nests. In 1976, 12 of the 16 red-tail-built nests were used by redtails, one was used by Great Horned Owls, and one was inactive. The remaining two nests were probably also used by redtails as they were still in excellent repair when I discovered them in 1977.

Fourteen nests were found in pin oak, 4 in bur oak (*Quercus macrocarpa*), 2 each in jack pine, white pine (*Pinus Strobus*), American elm, and trembling aspen, and one in red oak, basswood, tamarack, green ash, large-toothed aspen, cottonwood (*Populus deltoides*), and black willow.

Nest heights averaged 14.0 m and ranged from 5.5 m (the squirrel nest, in a pin oak) to 22.6 m (an artificial nest in a white pine). Artificial nests averaged 14.1 m in height (range: 10.1 m to 22.6 m). Natural nests averaged 13.9 m (range: 5.5 m to 19.2 m).

Twenty-six (79%) nests were in woodlot edges (arbitrarily defined as within 15 m of the outer boundary) or in scattered trees in open locations, such as in fencerows or pastures; 7 nests (21%) were in the interior of wooded areas. Of the natural nests, 82 percent (14) were classified as edge nests, and 18 percent (3) were classified as interior nests. Of the artificial nests, 75 percent (12) were edge nests, and 25 percent (4) were interior nests.

Nests were often quite close to areas of human activity. Active nests averaged 0.59 km from the nearest occupied human dwelling (range: 0.16 km to 2.4 km), and 0.58 km from the closest improved (at least periodically graded) road (range: 0.16 km to 2.6 km).

Placement and Success of Artificial Nests. Fifty artificial nests were erected in the study area in 1976: 25 in January, February, and March, and 25 in July and August. The procedure that I used to construct them is outlined in an earlier paper (Bohm 1977). My primary objective was to determine how readily they would be accepted by raptors, redtails in particular. In 1976, redtails nested on two of the platforms that were available to them (the first 25); none was used by owls. According to Baumgartner (1938), nest selection by Great Horned Owls occurs in late fall, several months prior to actual nesting. The fact that owls used none of the nests that were erected in January, February, and March seems to substantiate this.

In the 1977 nesting season, there were 50 artificial nests available. Because nests were often placed relatively close to each other, in clusters or groups, I estimated that the 50 nests represented 28 probable territories, i.e., areas that would likely support only one breeding pair of raptors of the same species. One of these territories was eliminated when a woodlot was logged in the fall of 1976. Nests in 14 (52%) of the remaining 27 areas were used in 1977 by Great Horned Owls. The only nest used by redtails in 1977 was one of these same 14. I believe a significantly higher utilization rate could have been attained if only one or two nests had been placed in a potential territory. Several nests were also purposely placed in areas that did not seem to be particularly favorable locations for raptor nests; none of these was utilized. Several artificial nests were selected when placed in woodlots that seemed to be suitable for raptors but that did not contain any natural nests.

Nest Density. Nests were often widely scattered throughout the study area. However, in a 28.5 km^2 area that was thoroughly searched, I believe all active nests were located. Six were found, representing 0.21 nests per km^2. I found no redtail nests. In the previous nesting season, 1976, I found 3 active Great Horned Owl nests and 3 redtail nests within the same area. In the more heavily wooded areas of central Minnesota, the density of nesting owls is perhaps higher. In Wisconsin, Orians and Kuhlman (1956) found that the Great Horned Owl population ranged from 0.05 to 0.08 pairs per km^2 (1953–1955). Hagar (1957), in New York, found 0.09 pairs per km^2, and Smith (1969), in Utah, found 0.14 pairs per km^2. On the basis of hooting censuses, Baumgartner (1939) estimated 0.39 to 1.16 pairs per km^2 near Lawrence, Kansas.

Productivity. I considered a nest to be successful if at least one nestling survived to approximately four weeks of age. At this age, most young Great Horned Owls have a fair chance of survival if forced from the nest. Premature departure may in fact be a fairly common phenomenon, for many of the nests used by owls are already in poor condition at the beginning of the nesting season. In a Wisconsin study, Orians and Kuhlman (1956) found that all the owlets that prematurely left their nests eventually survived. Similar results were found by Errington (1932). I found this to be true also. In two instances I found owlets that had prematurely left their nests. On one occasion, after an extremely windy night, I discovered two owlets on the ground near the base of their nest tree. They both seemed to be in good condition, even after a 16 m tumble. They were apparently being fed by an adult, as several small chunks of flesh were on the ground between them. In another area, about a week later, I found an owlet at the base of a large tree, approximately 150 m from the original nest tree. Again, it was apparently being fed by at least one adult, as it was surrounded by parts from several Redwings (*Agelaius phoeniceus*). In both of these instances the owlets appeared to be 3 to 4 weeks old when I found them; I located them again approximately two weeks later, and they appeared to be doing well.

Nesting Success. Forty-two percent (14 of 33) of the initial nesting attempts were unsuccessful. Failure rates in other studies have been 36 percent (4 of 11) in Montana (Seidensticker and Reynolds 1971), and 31 percent (4 of 13), 5 percent (1 of 17), and 27 percent (3 of 11) in Wisconsin in 1953, 1954, and 1955, respectively (Orians and Kuhlman 1956). The 19 successful nests (58%) produced 35 young, or 1.8 per nest. Successful nests in other investigations produced 1.7 owls (Hagar 1957), 1.8 (Seidensticker and Reynolds 1971), and 1.6, 2.0, and 1.8, in 1953, 1954, and 1955, respectively (Orians and Kuhlman 1956).

Fifty percent of the artificial platforms that were utilized were successful; 65% of the natural nests were successful (table 1). The high rate of failure of artificial platforms

Table 1. Nesting Success in Artificial and Natural Nests.

Nest type	Number	Successful	Unsuccessful	Total young	Young per nesting attempt	Young per successful nest
Artificial	16	8	8	14	0.9	1.8
Natural	17	11	6	21	1.2	1.9

may be explained in part because they were often erected in locations where they were quite accessible. My activity around the nests may have attracted additional human attention. Also, two of three late nesting attempts were on artificial platforms. These attempts, perhaps renesting attempts, were particularly unsuccessful; all failed. I checked the latest of these on 10 May 1977 and found two owlets, both with their eyes still closed. Assuming them to be no older than one week, and using a 28-day incubation period (Bent 1938), I estimated that the clutch was laid during the first week of April. I found that most owls began incubating by the end of the first week in March; the earliest incubating owl that I saw was on 20 February.

The success rates of edge nests (58%) and interior nests (57%) were similar (table 2). This finding surprised me somewhat since I had thought that owls using the more conspicuous edge nests would be more vulnerable to human-related disturbances. (I believe that this aspect of Great Horned Owl productivity, comparing nest success to nest location, warrants further investigation.)

Nest Failures. Causes of nest failures were impossible to determine in most cases. It appeared, however, that at least three were caused by human interference. A fourth nest, which was being used by owls in February was being used by redtails in April. It was not known whether interaction occurred between the hawks and owls, or whether the hawks appropriated the nest after the attempt by the owls had already failed. A similar situation occurred in Montana (Seidensticker and Reynolds 1971). Raccoons (*Procyon lotor*) may have been responsible for some nest failures. On several occasions I saw them sleeping on leafy nests high in the treetops, most often on sunny days in April and early May. The crow (*Corvus brachyrhynchos*) may also be responsible for some nest failures. At one nest I saw nearly a dozen of them mob an incubating owl and chase it from its nest. This particular nest, however, eventually proved to be successful.

Clutch Size. The clutch size was known in seven nests in 1977; five nests contained two eggs, and two nests contained single eggs. Although I found 10 owl nests in 1976, I did not know their clutch sizes. However, I did know the number of nestlings per successful nest for both years (table 3). In 1977, 10 of 19 successful nests contained two owlets. The frequency of three-owlet nests was noticeably lower than in the 1976, when half the nests that I examined contained three nestlings. It would be interesting to know how weather conditions affect productivity. The winter of 1976–1977 was particularly severe in central Minnesota. Daily temperatures averaged 4.7 degrees C below normal (mean –13.7 degrees C, range –36.6 degrees C to 5.6 degrees C) in December and 6.2 degrees C below normal in January (mean –16.5 degrees C, range –41.7 degrees C to 1.1 degrees C) (U.S. Weather Bureau, St. Cloud, MN). Extreme conditions of this sort certainly place an increased energy demand upon organisms and are perhaps reflected in reproductive productivity. Food availability during the nesting cycle would, of course, also affect productivity. Hagar (1957) and Smith (1969) speculated that winter weather conditions may have affected productivity changes in Great Horned Owl populations in New York and Utah, respectively.

Behavior. While we were banding nestlings, we observed some rather unusual behavior. At one nest, just as I was preparing to climb to the nest, another individual and I were surprised to see an adult Great Horned Owl land on the ground perhaps 30 m from us. The owl proceeded to shuffle about among the dry leaves, holding its wings out and away from its body, with the underside toward us, in a manner similar to the threat display posture used by young redtails. At no time did it turn the backs of its wings toward us, as nestling Great Horned Owls characteristically do when threatened. This display lasted nearly a minute and was accompanied by bill snapping. The owl then flew into the woods, only to return and land on the ground again. This time the display lasted only 10–15 seconds before the owl flew back into the woods. When I climbed to the nest, both adults flew from tree to tree and hooted intermittently but came no closer than about 40 m. Errington (1932) saw a similar display by an adult owl in which the owl flapped about on the ground as though it were injured.

Table 2. Nesting Success in Edge and Interior Locations.

Nest type	Number	Natural suc/unsuc		Artificial suc/unsuc		Young produced	Young per nesling attempt	Young per successful nest
Edge	26	9	5	6	6	28	1.1	2.0
Interior	7	2	1	2	2	7	1.0	1.8

Table 3. Numbers of Nestlings per Successful Nest.

Year	Nestlings per successful nest 1	2	3
1976	2	3	5
1977	6	10	3

Adult behavior at any nest is unpredictable. On a large artificial platform containing a pair of three-week-old young, the adult sat tight until the climber thumped on the bottom of the nest with his fist. Other adults flushed when a climber was partially up the tree. No climber was actually struck by an owl. Behavior of this sort was perhaps discouraged in many cases by the presence of one or two other persons at the nest site. However, even with several people in the vicinities of nests, adult owls often became quite excited as the climber neared the nest. Several uttered an amazing variety of calls, perhaps best described as a mixture of hoots, barks, and whistles.

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BACTERIAL ISOLATES FROM THE PHARYNX AND CLOACA OF THE PEREGRINE FALCON (*FALCO PEREGRINUS*) AND GYRFALCON (*F. RUSTICOLUS*) (BACTERIA FROM FALCONS)

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Abstract
Swabs taken from the pharynx and cloaca of Peregrine Falcons (*Falco peregrinus*) and Gyrfalcons (*Falco rusticolus*) yielded many species of bacteria, including *E. coli*, *Proteus* sp., *Staphylococcus aureus*, *Pasteurella anatipestifer*, and *Pseudomonas aeruginosa*. Some of these organisms may be significant in the context of raptor disease.

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